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APPLICATION NUMBER: *60/549,942*
FILING DATE: *March 05, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/06788*

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

INVENTOR(S)

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Pablo M.	**Robert**	**Blacksburg, Virginia**
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☐ *Additional inventors are being named on the____ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

HARDWARE ABSTRACTION OF MIDDLEWARE

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* [ ]

☒ Drawing(s) *Number of Sheets* [ ]

☐ Application Data Sheet. See 37 CFR 1.76

☐ CD(s), Number [ ]

☐ Other (specify) [ ]

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT *(check one)*

☒ Applicant claims small entity status. See 37 CFR 1.27.

☒ A check or money order is enclosed to cover the filing fees

☒ The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number **50-2041**

☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE AMOUNT ($): **$80.00**

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE

Date **3/5/04**

TYPED or PRINTED NAME **Michael E. Whitham**

REGISTRATION NO. *(if appropriate)* **32,635**

Docket Number: **01640454PR**

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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

If you need asssitance in completing the form, call 1-800-PTO-9199 and select option 2.

HARDWARE ABSTRACTION OF MIDDLEWARE

This is a specific way of implementing middleware such that hardware outside a general-purpose processor can be directly connected through middleware

In the implementation of SCA (software communications architecture)-compliant software-defined-radio (SDR), a military standard, data channels are necessarily directed through CORBA, which resides on the system's general-purpose processor (GPP). Because of this feature, when two different resources in this architecture are connected, regardless of what platform they happen to be implemented on, the GPP must receive, process, and re-transmit all data passed between different resources (see Figure 1). This process can be very taxing on the computing platform. The concept shown in this disclosure is the extension of the CORBA ORB outside the scope of the GPP using a hardware switch matrix, allowing different hardware components of the SDR to communicate directly, greatly increasing the efficiency of the implementation (see Figure 2).

The switch matrix is a custom fabric that is used for the connection of multiple devices within a core or set of cores. By integrating the switch matrix into the middleware, the switch matrix now becomes an integral channel for communication.

5. What is the existing technology/art to which you are comparing?

Middleware implementations are based on centralized channel control. In this case, generic middleware (like CORBA), is developed to support not only software object portability, but also embedded hardware portability.

6. How does your INVENTION differ from present technology, what problems does it solve, or what advantages does it possess? (This should be written so someone skilled in the art can understand it.)

It significantly reduces the overhead inherent to the implementation of middleware in an embedded environment, making it possible to create a lightweight ORB that is fully compliant with the SCA v 2.2. There are several other benefits, including:

- High level of scalability, since the GPP bottleneck is greatly reduced.
- Easy upgrade path
    - Relatively easy to add new devices and swap the operating devices
- Complements refined software radio design methodology
    - Easy partitioning of functionality
- Easier integration of reconfigurable computing platforms
    - Allows the direct connection of different platforms with little GPP overhead
    - Isolates reconfigurable computing modules
    - Eases integration of different reconfigurable computing platforms
    - Extension of middleware connections outside GPP allows for efficient embodiment of customized connectivity approaches (switching fabrics)
    - Eases restrictions required to support power management
    - Eases integration of ASICs cores into system design
    - Eases development

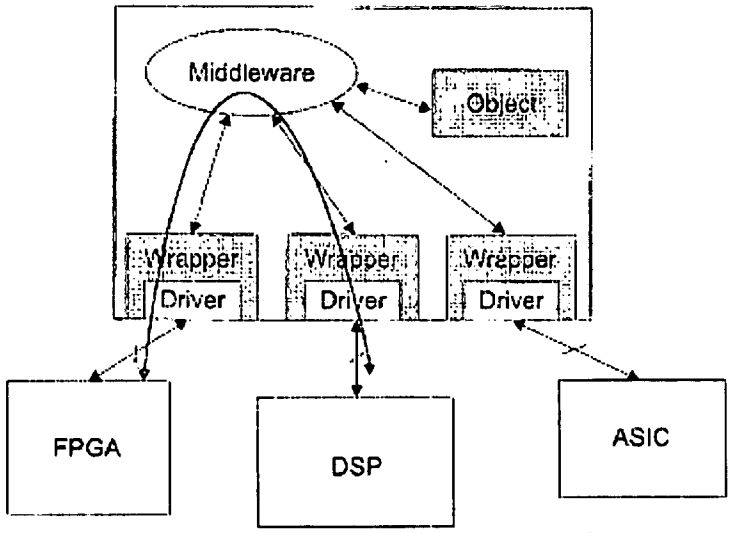

Figure 1 – Messages handled by middleware in GPP

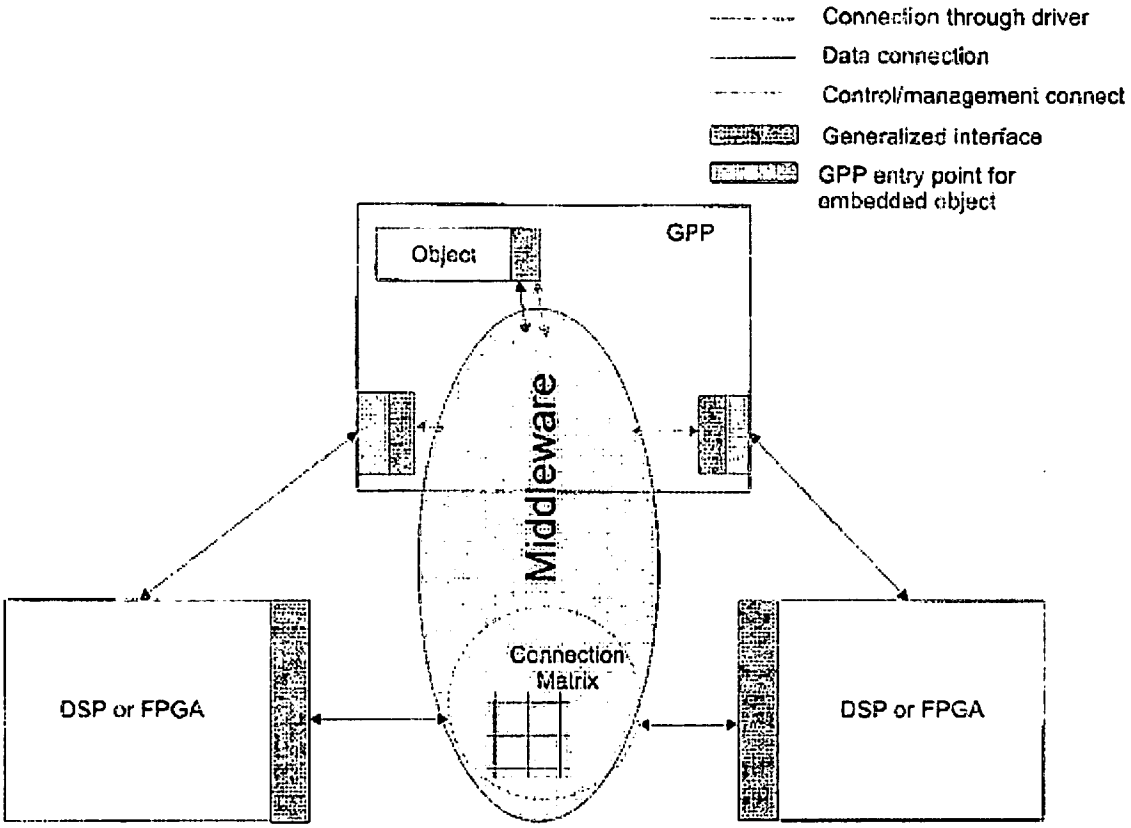

Figure 2 – Extraction of middleware functionality outside of GPP